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ABSTRACT

Studies of how children spend their time in school, how teachers' perceptions and student characteristics affect interactions and the use of time in classrooms, and how the concept of time relates to student achievement were reviewed in preparation for an investigation of the extent to which different groups of children have different learning opportunities. The intent was to build a data base to be used in relation to current practices of referring, assessing, and placing students of different learning chracteristics. Two areas of relevant research are reported: studies of time in relation to achievement and studies of teacher student interaction and student response as dependent on varying teacher expectations and student characteristics. The research on instructional time is discussed in five categories: (1) quantity of schooling, or time in the school day; (2) teacher reports of opportunity to learn; (3) teacher reports of allocated time; (4) direct observation of allocated tme; and (5) student engaged time. A conclusion reviews the results of the literature survey and is followed by a list of references. (Authors/JD)

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Monograph No. 17

ACADEMIC ENGAGED TIME AND ITS RELATIONSHIP TO LEARNING: A REVIEW OF THE LITERATURE

Janet Graden, Martha L. Thurlow, and James E. Ysseldyke

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Janet Graden, Martha L. Thurlow, and James E. Ysseldyke

Institute for Research on Learning Disabilities

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January, 1982

Abstract

Studies of how children spend their time in school, how teachers' perceptions and/or student characteristics affect interactions and the use of time in classrooms, and how the concept of time relates to student achievement are reviewed. Methodological issues regarding studies of how time is spent in school and the relationship of time spent learning to achievement are discussed. Research studies designed by the IRLD to meet current research needs in the area of how time is spent in schools are discussed.

Table of Contents

	Page
Abstract	i
Introduction	1
Time and Learning	3
Quantity of Schooling	5
Opportunity to Learn (Teacher Reports)	8
Allocated Time (Teacher Reports)	10
Allocated Time (Direct Observation)	15
Student Engaged Time	17
Teacher-Student Interaction and Teacher Expectations	23
Conclusion	30
References	33
Figure 1	41

Academic Engaged Time and Its Relationship to Learning: A Review of the Literature

Children spend a tremendous amount of time in school. While in school, however, they are not necessarily learning. Even the best students are not expected to be engaged in learning at all times. Numerous studies have demonstrated a strong positive relationship between the amount of time a student actually spends in learning and the student's achievement. The "learning" time of interest in these studies involves an active process in the student, and has been given such labels as "opportunity to learn," "academic engaged time," and "time on task." With increasing concern about declining student achievement levels in many school districts, the question of how much time the student spends in active learning has engendered great interest (cf. Berliner & Rosenshine, 1977; Borg, 1980; Frederick & Walberg, 1980; Helms, 1980; Hoge & Luce, 1979; Rosenshine, 1976, 1978, 1979; Rosenshine & Berliner, 1978; Ruff, 1978).

Teacher expectations for a student also have been demonstrated to have considerable influence on the student's performance in school. Numerous studies have documented that teachers' expectancies affect how they interact with students and how they allocate resources, including the resource of time, to students (cf. Goldenberg, 1966; Good, 1970; Good & Brophy, 1972). Further, research has shown that teachers' expectations for students are influenced by such student characteristics as sex (Jackson & Lahaderne, 1967), attractiveness (Berscheid & Walster, 1974), race (Rubovits & Maehr, 1973), socioeconomic status

(Miller, McLaughlin, Haddon, & Chansky, 1968), intellectual level (Rubovits & Maehr, 1971), current achievement level (Brophy & Good, 1974), and special education classification (Foster & Ysseldyke, 1976; Foster, Ysseldyke, & Reese, 1975).

Describing how students spend their time in classrooms is a necessary element in understanding factors that affect academic success or failure, one which should have important implications for assessment, decision making, and intervention with students, especially those who reportedly are displaying educational difficulties. Leonard (1981) suggests that time is a critical issue to consider in providing an appropriate education to all students as required by Public Law 94-142, and Bloom (1980) states that time is an "alterable variable" that is available to all students.

Research conducted by Minnesota's Institute for Research on Learning Disabilities (IRLD) has revealed significant problems in current practices of referring, assessing, and placing students (cf. Christenson, Graden, Potter, Taylor, Yanowitz, & Ysseldyke, 1981). IRLD research also has suggested that schools operate within a referral-to-placement paradigm, rather than one emphasizing the testing of alternative instructional interventions before evaluating the student for possible special education placement (Christenson, Ysseldyke, & Algozzine, in press). Clearly, it is important to investigate the extent to which different groups of children have different opportunities to learn, both before any kind of referral has been made and also when a student is receiving special education services.

In line with this need, the IRLD proposed to conduct observational studies to answer five broad questions:

(a) To what extent are there differences in the nature of instruction and student academic responding time for students at different levels of teacher-perceived academic competence?

(b) To what extent are there differences in the nature of instruction and student academic responding time for students at different levels of teacher-perceived behavioral competence?

(c) To what extent are there differences in the nature of instruction and student academic responding time for LD and non-LD students?

(d) To what extent are there differences in the nature of instruction and student academic responding time for students in different reading groups?

(e) To what extent do changes occur in the nature of instruction and student academic responding time for a student from the time of referral to one month after an IEP is written to two months after an IEP is written?

The above research questions address the need for a data base on "normative" levels of time variables for students of varying characteristics; the importance of such a data base has been described by Berliner (1976), Hall, Greenwood, & Delquadri (undated), and Rosenshine (1978, 1979).

In preparation for interpreting the information obtained from the observational studies, an extensive review of the literature was conducted, and is summarized here. Two lines of relevant research are reported: (a) studies of time in relation to achievement, and (b) studies of teacher-student interaction and student responding as dependent on varying teacher expectations and student characteristics.

Time and Learning

Studies of the importance of time as a variable in learning stem from the work of Bloom (1974), Carroll (1963), Wiley and Harnischfeger

(1974), and Harnischfeger and Wiley (1976), who proposed various models of learning in which time in learning is considered to be a primary variable in determining the extent to which learning takes place. The basic premise of these and other models is that students must be engaged actively in the act of learning in order to achieve. Harnischfeger and Wiley (1976) stated that the amount of active learning time a student spends is the most important determiner of achievement. Hall et al. (undated) also are strong proponents of the importance of students having the "opportunity to make an active learning response" (p. 13); they report further that they believe that lower achieving students, in particular, do not receive sufficient opportunities to respond. The view that opportunity to respond is crucial, yet is generally lacking in our schools, also is supported by Baer and Bushell (1981).

"Time" can be delineated in a variety of ways, and the several studies of time have employed many definitions of time variables. One method of categorizing school variables breaks time down into successively decreasing units, as portrayed in Figure 1. The largest unit of time that has been studied is the time available to a student (i.e., Time in the School Day). Within the school day, however, only a portion of time is allocated to instruction, with remaining time used for lunch, recess, etc. This portion can be labeled Time Allocated to Instruction; it has been the time variable of interest in several studies. Continuing in the breakdown, all of the time that is allocated or scheduled for instruction is not spent in actual instruction. Inevitably, time is lost to transitions between subjects, attending to class business, etc.

Measurement of Time Spent in Instruction has been obtained through direct observations of the classroom. During the time in which instruction is occurring, a given student may or may not be attending, or engaged, in the instruction. Thus, a further breakdown, one that has been the focus of many studies, is the Engaged Time of students, or the time on task. A final breakdown described in the observations of Hall et al. (undated) and Greenwood, Delquadri, Stanley, Terry, and Hall (1981) is that portion of the time in which a student is attending and is making an active academic response; this is labeled Academic Responding Time. The rationale for this final breakdown is the assertion that a student learns best through academic response and practice.

Insert Figure 1 about here

The breakdown of time portrayed in Figure 1 provides the outline for the review of research studies on time and learning. Time in the school day is included in the discussion of quantity of schooling. Time allocated to instruction is covered in two sections: (a) opportunity to learn as it relates to teacher reports of content covered, and (b) teacher reports of allocated time. The next section on time spent in instruction is based on direct observations of allocated time. The final section on student engaged time includes both engaged time and its subpart, academic responding time.

Quantity of Schooling

An extended study of quantity of schooling is provided by Mann's (1928) report of time variables in schools from 1826-1926. Where data were available, the length of the school day and the days of school

per year were reported. Mann found that considerable variability existed in the length of the school day as reported by 444 cities.

Several studies have addressed the question of whether the amount of schooling a student receives makes a difference. In viewing the amount of schooling received, these studies have focused on general measures of quantity such as years of schooling, days in the school year, or length of the school day, and have relied on report methodologies.

One major study of the effect of schooling was the Coleman report (Coleman, 1966), which concluded that school variables did not account for differences in achievement of minority students and that family variables such as SES were more important. Coleman reported no significant relationship between the length of the school day or the emphasis placed on attendance and achievement scores of students.

Coleman's study was followed by several re-analyses of the data. In some cases, the re-analyses supported his conclusions, and in others they refuted them. Jencks (1972) generally agreed with Coleman's conclusions; he reported that the relationship between the length of the school day or the number of school days in a year and school achievement was insignificant. However, Jencks did suggest that quality of schooling was important because he found that during the 1968 New York City teachers' strike, students' achievement scores dropped, apparently reflecting the drop in amount of schooling. In another re-analysis of the Coleman data, Wiley and Harnischfeger (1974) challenged the conclusion that amount of schooling does not make a difference. They reported wide variation in the amount of schooling received by students

in one city; the range was from 710 hours to 1150 hours per year. From a prediction equation based on hours of schooling as it relates to achievement, they reported that 24% more schooling would result in a gain of 2/3 grade in reading and 1/3 grade in math. An attempt by Karweit (1976) to replicate the Wiley and Harnischfeger study indicated also that quantity of schooling was important, but failed to find an effect reaching the magnitude reported by Wiley and Harnischfeger. In a relatively recent re-examination of the Coleman data, and a study of pupils over two school years and the intervening summer, Heyns (1978) reached the conclusion that quantity of schooling was important, particularly to low SES students. This judgment was based on the finding that during the school year, the difference in achievement levels of high and low SES students was smaller than the difference after the summer. This finding indicated to Heyns that schools help make up the difference between the two groups of students.

That these various researchers have analyzed the same data (the Coleman report) and reached opposing conclusions is due to differing means of data analysis and definitions of amount of schooling. For a more thorough analysis of the methodological differences, refer to Wiley and Harnischfeger (1974), Karweit (1976), and Heyns (1978).

In two studies of the achievement of Follow-Through classrooms by Stallings (1975, 1976) and Soar (1973), one of the variables investigated was the length of the school day in relation to pupil achievement. Stallings reported that a longer school day was positively related to class achievement in both reading and math, and that the length of the

school day varied by as much as two hours per day across classrooms. Soar found that the length of the school day in first grade was negatively related to achievement gain. Although both were studies of Follow-Through classrooms, the differences in results may be partially accounted for by differences in the samples, the grade levels studied, and the achievement measures employed.

Years of school also has been used to measure quantity of schooling. Hyman, Wright, and Reed (1975) summarized the results of various surveys on the amount of education received by students and its relation to achievement variables. They reported that number of years of schooling were related positively to outcome measures such as higher achievement. However, this relationship is correlational, not causational, and it cannot be inferred that more years in school lead to higher achievement. It could be that a third variable (e.g., SES, IQ) mediates the relationship.

Quantity of schooling is not a very precise measure compared to other methods of quantifying how time is spent in school. It is not surprising that studies on this variable have reached vastly different conclusions because they often were based on different definitions and methods of data analysis. The major finding of studies of quantity of schooling is the considerable variability in the amount of schooling received by individual students in different classes, schools, or cities.

Opportunity to Learn (Teacher Reports)

A second method of studying the importance of time in learning has been to assess the extent to which a student has had an opportunity

to learn or has been exposed to the content covered by an achievement outcome measure. Teacher reports of content covered have been the primary data collected in studies of opportunity to learn.

Several studies on opportunity to learn have been international examinations of achievement in mathematics and science in relation to several variables, including content covered and hours of instruction. In three international studies (Husen, 1967; Comber & Keeves, 1973; Purves & Levine, 1975) the correlations of both hours of instruction and opportunity to learn with achievement were low but significant, with the correlations varying widely between countries. In these studies, teacher judgment of achievement test items was used to assess whether the students had the opportunity to learn the content of each item. Husen reported a correlation of .12 between opportunity to learn content and achievement, with a range in correlations across countries from .03 to .55. Broad ranges also were reported in the hours of instruction students reportedly received across countries; for example, Husen reported a range from 950 hours to 1241 hours per year devoted to math instruction.

Using the same methodology as the international studies, Chang and Raths (1971), Borg (1979), and Arehart (1979) reported significant relationships between opportunity to learn and achievement test performance. In another study of opportunity to learn, Good, Grouws, and Beckerman (1978) collected teacher reports of content covered, and directly observed the number of math pages covered in a given time by teachers judged to be successful or unsuccessful. They reported a correlation between number of pages covered and class achievement of .64 ($p < .01$). Additionally, they reported that in the same amount of

time, successful teachers covered significantly more pages than unsuccessful teachers.

Two other studies in this category investigated the relationship between opportunity to learn (as evidenced by teacher reports of instructional emphasis) and achievement. In an in-depth descriptive study of eight schools, Brookover and Lezotte (1979) found that schools with improving achievement scores placed a greater emphasis on the basic skills of reading and math and spent more hours in reading instruction. In a three-year study of reading instruction in which teachers reported time spent on instruction, Rupley and McNamara (1978) reported that there was a linear relationship between time spent on reading and achievement over the first two years; however, by the third year, the trend had reversed such that achievement was inversely related to time spent in direct instruction. This inconsistent finding may be partially attributable to the methodology employed.

With the exception of the Rupley and McNamara study, the research consistently has demonstrated a significant, positive relationship between opportunity to learn and achievement. This relationship suggests that in order to learn, a student must have been exposed to the content--a conclusion that appears obvious. However, one drawback of all these studies is that they employed a report methodology, which has been criticized as a measure subject to error in estimation (Borg, 1980).

Allocated Time (Teacher Reports)

The measure of allocated time is a more refined method of reporting how time is spent in schools than such global measures as length of

day or emphasis of instruction. Allocated time is that portion of the day that is allocated, or scheduled, for instruction. Allocated time is a measure of opportunity to learn in that it is an estimate of the time that a student is exposed to academic instruction; it excludes that portion of the school day during which instruction does not occur (e.g., recess and lunch). Studies primarily have employed one of two methodologies for assessing allocated time. One method is teacher reporting of the amount of time allocated to various instructional areas; the second method is direct observation of classrooms to report the amount of time actually spent on various instructional activities. Studies employing the first of the two methodologies, teacher reports of allocated time, will be presented in this section; studies employing direct observation will be reviewed in the following section.

The major studies of allocated time using teacher reports have been conducted by the Beginning Teacher Evaluation Study (BTES) at Far West Laboratories. Allocated time is just one component of the comprehensive set of time variables studied by BTES; other components will be discussed in later sections. From 25 second grade teachers and 21 fifth grade teachers, BTES collected logs of time allocated to instructional and non-instructional activities over the course of the school year. In a discussion of the findings, Rosenshine (1980) reported that, overall, 58% of class time was allocated to academic instruction, 23% to non-academic instruction (e.g., music, art), and 19% to non-instructional events, such as transitions between subjects. For second grade students, an average of 2 hours 15 minutes per day was allocated to academic instruction, 55 minutes per day to non-academic instruction, and 44 minutes

to non-instructional class time. For fifth grade students, the averages were: 2 hours 50 minutes to academic instruction, 1 hour 5 minutes to non-academic instruction, and 45 minutes to non-instructional class events.

In another report of the BTES data, Fisher, Berliner, Filby, Marliave, Cohen, and Dishaw (1980) reported wide differences in the amount of time allocated to academic subjects across classrooms. For example, across second grade classrooms, the average daily amount of time allotted to math was 25 minutes per day and the highest was 60 minutes per day. In fifth grade reading, the average daily time allocated ranged from 60 minutes per day to 140 minutes per day. Over the course of the school year, these differences in daily allocated time add up to large differences. Berliner (1980a), reporting on allocated time for math only, stated that for second grade, the amount of time allocated to math for the school year ranged from 30 hours to 58 hours across the classes studied. For fifth grade, the range in yearly time allocated to math was from 18 hours to 53 hours. The range of the amount of time allocated to reading over the year was vast also; Berliner (1979) reported a range from 120 hours to 298 hours per year across classrooms. As these data indicate, some students received more than twice as much instruction in reading as other students. Another finding of the BTES report was that allocated time was positively related to student learning; therefore, the differences in allocated time have important consequences in student achievement.

Other studies of teacher reports of allocated time have resulted in findings similar to the BTES results of (a) a significant, positive

correlations between allocated time and student achievement, and (b) wide differences in allocated time across classrooms. Three studies reported that time allocated to instruction was significantly related to student achievement in reading (Guthrie, Martuza, & Seifert, 1976; Kiesling, 1977; Jacobsen, 1980). Jacobsen (1980) also found a significant relationship between achievement and time allocated to math instruction. Smith (1979) reported only a "very slight" (r = .23) relationship between time allocated to social studies and social studies achievement. Furthermore, Smith reported than when IQ was controlled for, the relationship was no longer significant. These studies also reported broad ranges in allocated time across classrooms. Jacobsen reported that time allocated in third grade classes ranged from 52.3 to 75.9 minutes per day in reading and 40.7 to 89.4 minutes per day in math. Guthrie et al. received reports from second and sixth grade teachers and found that time reported as allocated to reading ranged from 8 minutes per week to 600 minutes per week. For fifth grade social studies, Smith reported an allocated time range from 9.3 to 47.4 minutes per day. In Mann's (1928) study of schools from 1826-1926, differences in time allotted to various academic subjects across cities were evident in 1926. Mann reported the ratios of maximum time allocated to minimum time allocated; his findings indicated that students in cities with the highest time allocations received 11.8 times more instruction in reading, 4.4 times more instruction in math, and 48.0 times more instruction in spelling than students in cities with the lowest time allocations.

Two studies employing teacher report methodologies of allocated time failed to find a significant relationship between allocated time

and achievement. In a study by Harris and Serwer (1966), time allocated to reading was held constant at 180 minutes per day in all classrooms, yet class achievement varied. They attributed the differences in achievement tc another time variable: time actually spent reading. Welch and Bridgham (1968) found no relationship between high school teachers' reports of time allocated to a physics unit and students' achievement gains for that unit.

Roehler, Schmidt, and Buchman (1979) observed elementary classrooms over 12 entire days, focusing primarily on language arts instruction (including reading). They reported wide variability in teachers' reports of time allocated to all instruction across classrooms--from 58% of the day to 73% of the school day. For language arts alone, the range in allocated time was 80 minutes per day to 126 minutes per day; for math, the range was 23 minutes per day to 63 minutes per day.

It is not surprising that there are mixed results regarding the relationship between allocated time and achievement. Although teacher reports of allocated time are more specific measures of the impact of instructional time than global measures such as length of day or "emphasis" on instruction, teacher reports are not very accurate measures of time; they leave much room for error. Additionally, the correlation between time and achievement depends on the extent to which achievement measures reflected the content of the curriculum. Researchers in the area have stated that the strongest correlations will result from the use of content-relevant achievement measures (Berliner, 1976; Karweit & Slavin, 1981) and from more specific measures of time (Frederick & Walberg, 1980). Other methodological considerations are discussed

by Centra and Potter (1980).

Allocated Time (Direct Observation)

A more precise measure of allocated time than teacher report is the direct observation of classrooms to assess the amount of time actually spent on instruction. As studies have demonstrated, there may be considerable discrepancy between time scheduled for instruction and time actually spent in instruction (Felsenthal & Kirsch, 1978; Frederick, Walberg, & Rasher, 1979; Jacobsen, 1980; Karweit & Slavin, 1981). Several researchers have reported the percentage of allocated time that is actually spent in instruction. Jacobsen reported that the percent of time used of time available ranged from 60% to 94% in reading and from 75% to 92% in math; Felsenthal and Kirsch studied reading time only and found the percent of scheduled time actually used ranged from 57% to 99%. Other researchers have discussed the difference between time scheduled and time used in terms of time lost for instruction. Karweit and Slavin, studying math instruction only, reported that lost minutes ranged from 56 to 140 minutes per week for a class. Frederick et al. found that amount of lost time was significantly related to school achievement; they reported that schools with higher achievement displayed smaller percentages of lost time.

Several studies have employed direct observation in the assessment of allocated time. One set of such studies has been conducted by Hall, Greenwood, and others at Juniper Gardens Children's Project. The observations of the Juniper Gardens project differ from those of BTES and most other studies of time in that an individual student is the focus of observation over the entire instructional school day. Hall et al.

(undated) observed 12 students in grades 1-4 for five weeks; their results revealed that 75% of the day was allocated to instruction (42% to reading and 26% to math). In another study of 93 fourth grade students, Greenwood et al. (1981) reported that an average of 4.1 hours per day was allocated to all instruction (3.3 hours per day allocated to academic instruction with 56.73 minutes per day of this time allocated to reading instruction). The range in daily allocated instructional time across students was 3.9 hours to 4.2 hours.

Other observational studies of allocated time (Cooley & Leinhardt, 1980; Leinhardt, 1977) have videotaped portions of the school day, focusing on the class, not individual students, as the unit of analysis. Cooley and Leinhardt reported that there was no significant relationship between allocated time for instruction for a class and class achievement. Leinhardt highlighted the variability in allocated time across classrooms: from 44.16 to 70.7 minutes per day in math and from 76.0 to 120 minutes per day in reading.

In another observational study of instructional time, the teacher, not the class or individual students, was the focus of observation. Conant (1974) observed 47 elementary teachers for an entire day and found that only 30% of their time (100 minutes out of a 5 1/2 hour day) was spent in academic instructional activities.

In studies that reported correlations between observed allocated time and achievement, the results were inconsistent. This inconsistency may be due to the unit of observation (allocated time--which is not a precise measure of how time is actually used), the selection of achievement measures, or the unit of analysis (class or individual). Although

observation of allocated time may be a more direct measure than teacher reports, allocated time still is not the most precise way to assess how children spend time in school. For example, within allocated time, individual students may or may not be engaged in the academic task. Engaged time would therefore seem to be a more specific measure of time devoted to learning.

Student Engaged Time

Most studies on the importance of time in achievement have focused on the variable of engaged time. The time a student actually spends learning (engaged time) may be different from the time available for instruction (allocated time). For example, Hall et al. (undated) reported that although 75% of class time was allocated to instruction, the student was making an academic response during only 25% of the time.

Because of the nature of the variable of engaged time, studies of engaged time must rely on direct observation to determine whether a student is engaged. Studies differ, however, in their definitions of engaged time, in how it is observed, in the unit of observation (class or individual students), in the length of observation (entire instructional day or part of day), and in the type of students observed. Because of these methodological differences, the results of the studies often are very different. Overall, however, studies of engaged time yield stronger correlations with achievement than do other methods of time measurement.

Among the major studies of engaged time are those conducted at Juniper Gardens Children's Project (Hall, Greenwood, and others) and the Beginning Teacher Evaluation Studies at Far West Labs (Berliner

and others). The Juniper Gardens research efforts (Hall et al., undated; Greenwood et al., 1981) focus on individual students over the entire instructional day. They have observed students in grades 1-4 in inner city schools. In the Juniper Gardens observation system, engaged time is referred to as Academic Responding Time. In one study, Hall et al. found that during only 25% of the instructional day (minus lunch, recess, physical education, etc.) was the student actually engaged in making an academic response. This 25% of engaged time was broken down further as follows: 16% (1 hour per day) in writing, 3% (less than 11 minutes per day) in reading silently, and less than 1% (less than 4 minutes per day) in reading aloud. The remaining portion of the instructional day was spent in task management behaviors (53%) and inappropriate behaviors (18%). The researchers concluded that students spend most of their time in passive responding (e.g., listening, getting materials ready, waiting for instructions), and only a small portion of time in active academic responding. In their view, active academic responding is the key to student learning. Stallings (1980), in a separate study, reached the related conclusion that interactive on-task behaviors were important for learning. She reported that interactive on-task behaviors (e.g., reading aloud, discussing) correlated positively with achievement, whereas non-interactive on-task behaviors as well as off-task behaviors correlated negatively with achievement.

In another study, reported by Greenwood et al. (1981), differences in academic responding time between Title (schools which received federal monies for disadvantaged students) and Non-Title schools were examined. Their results indicated that students in the Non-Title schools spent

more time in academic responding; however, these results should be viewed cautiously because of the small number of schools (four) and the concomitant finding that the Title schools tended to be open concept and urban and the Non-Title schools more traditional and suburban. However, the findings did confirm that relatively little time in the school day involved the student academically responding, regardless of type of school (73 minutes per day in Non-Title schools; 62 minutes per day in Title schools). Furthermore, the amount of Academic Responding Time was reported as a significant predictor of achievement (r = .52).

Other major studies of engaged time, those of BTES, use the term Academic Engaged Time. Academic Engaged Time is refined further by the inclusion of the difficulty level of the material, forming the variable of Academic Learning Time (ALT), which is defined as "the amount of time a student spends engaged in an academic task which he/she can perform with high success" (Fisher et al., 1980, p. 8). BTES focused on individual students, and observations were conducted only during Reading and Math instruction. The BTES subjects included students in the second grade (n = 139) and fifth grade (n = 122) who displayed achievement higher than the 30th percentile and lower than the 60th percentile on a standardized test. Overall results of these studies demonstrated a significant relationship between engaged time and achievement, and further that ALT was a significant predictor of achievement. Correlations between engaged time and achievement were reported as generally between .3 and .5 (Borg, 1980).

In one report of the BTES findings, Rosenshine (1980) noted that

they observed an average of 1 hour 30 minutes per day of engaged time during reading and math periods in the second grade (1 hour 4 minutes in reading, 26 minutes in math); for the fifth grade, an average of 1 hour 55 minutes during reading and math periods was engaged time (1 hour 20 minutes in reading, 35 minutes in math). Also notable was the variability in engaged time observed. For second grade, the range was from 1 hour 5 minutes to 1 hour 55 minutes engaged time; in the fifth grade, engaged time ranged from 1 hour 20 minutes to 2 hours 30 minutes per day. Another finding reported by Rosenshine was that an average of 16 minutes per each observed hour (37% of the time) was spent not engaged. Of this time, eight minutes were in off-task behavior and eight minutes were in management behaviors. Overall, the student was academically engaged for over 70% of the observed time. Fisher et al. (1980) reported that the range of engaged time across classes varied from a low of 50% to a high of 90%. For individual students within the classes, the variability was even more extensive; Berliner (1980b) reported that the range in individual student engagement rates was from less than 10% to more than 90%.

In two separate reports of engaged time, Berliner addressed engaged minutes in math (1980a) and in reading (1979). Students were engaged during math from 20 minutes a day to 40 minutes a day in the second grade; over the school year, this translated to a difference of 28 more hours engaged time in math for the highest class compared to the lowest class. In the fifth grade, engaged minutes in math ranged from 17 minutes a day to 49 minutes a day, which yields a difference of 35 more hours a year engaged in math in the high class. For reading, the engaged time ranges were equally striking. Only fifth grade data were reported.

The range was from 48 minutes to 119 minutes a day engaged in reading, which equals 178 more hours engaged in reading in the highest class than in the lowest class.

In other studies of engaged time, the class, rather than individual students, has been the focus of observations. These studies generally sampled a number of students in the classroom, at various intervals, and (with one exception) observed students for only a portion of the school day. In a comprehensive national study, Stallings (1975) reported the results of observations in 273 first and second grade Follow-Through classrooms. Among her major findings were that time spent in academic activities was positively related to class achievement; this relationship held true for both reading and math. Furthermore, time spent engaged in non-academic activities, including art, music, and physical education was negatively correlated with achievement.

Studies by Cooley and Leinhardt (1980), Frederick, Easton, Muirhead, and Vanderwicken (1979), and Frederick (1977) employed methods of estimating class time on task through formulas accounting for variables such as percent of students present, percent of students on task, and students entering or leaving the classroom. Cooley and Leinhardt reported that the percentage of students on task ranged from 55.2% to 59.6%. They concluded that time spent learning, as defined by their formula, was a strong predictor of achievement, and conversely, that there was a negative relationship between non-academic responding and achievement. In the studies by Frederick et al. (1979) and Frederick (1977), the focus was on inner city classrooms that demonstrated either high or low achievement gains. Both studies reported that in high gain classrooms there

was better attendance, more time spent in instruction, and more efficient use of time.

Several other studies reported significant relationships between time on task (engaged time) and achievement (Anderson, 1975; Cobb, 1972; Gaver & Richards, 1979; Lahaderne, 1968; McKinney, Mason, Perkerson, & Clifford, 1975; Samuels & Turnure, 1974; Stallings, 1980). Cobb reported a correlation between on-task behavior and achievement of .40; McKinney et al. and Gaver and Richards found that attention to task was a significant predictor of achievement one school year or more later. Good and Grouws (1977) reported that in classes exhibiting achievement gains there was a greater focus on academic tasks, more student initiated responding, and less inappropriate behavior. Anderson (1975) observed engaged time and related it to performance on a content-specific achievement test. It was concluded that as more time was spent on task, higher achievement scores resulted; however, it is possible that pre-existing differences (such as cognitive abilities) contributed to the relationship.

One study (Felsenthal & Kirsch, 1978) failed to find a significant relationship between engaged time and achievement when pretest scores were accounted for in the analysis. However, observations of engaged time conducted by these investigators were not as detailed nor as precise as those measures yielding significant correlations.

The major findings of most engaged time studies have demonstrated that engaged time is related positively to achievement, that relatively little absolute time in the school day is spent engaged in academics, and that the percentage of time engaged varies considerably across

classrooms and across individual students within classrooms. Percentage of time engaged also varies significantly depending on how it is computed. For example, Hall et al. observed over an entire instructional day and reported that 25% of the time was engaged. BTES observed only during certain academic subjects and reported higher engagement rates, averaging 70% time engaged. The first method is a more accurate way to report percent of time available in the school day that is actually spent engaged.

Teacher-Student Interaction and Teacher Expectations

It has been demonstrated that time is an important variable in learning and that there is enormous variability in the amount of time individual students spend on academic tasks (engaged time) and/or receive academic instruction (allocated time).

One possible factor contributing to time differences is the teacher's expectations for the student. Interest in the effects of teacher expectations on a student's performance was generated by the work of Rosenthal and Jacobsen (1968). Their study has been critized on methodological grounds (Barber & Silver, 1968, Rubovits & Maehr, 1971; Snow, 1969; Thorndike, 1968), and efforts to replicate the study have yielded inconsistent results (cf. Claiborne, 1969; Meichenbaum, Bowers, & Ross, 1969). Several studies since have investigated the relationship between perceived or real student attributes and teacher interaction with students. Results of these studies have been contradictory; some have reported that higher students fare better than lower students; others have found that lower students receive some advantages from teachers, and yet others have revealed no differences between groups. Most of

these studies, which focus on the elementary classroom, have employed either observational or report methodologies for assessing interactions and have employed one of three methods of ranking students to assess teacher expectations or student behavioral differences: (a) teacher ratings of students in the classroom, (b) student's membership in pre-existing class groupings, such as reading groups or special education classification, or (c) student's performance on a standardized test.

Several observational studies of classrooms have indicated that student rank results in differences in either student behavior (e.g., time spent on task) or teacher interaction with students. Goldenberg (1966) reported that first grade teachers spent more time with their high reading groups and conducted the high reading groups during "prime time" (i.e., in the morning as opposed to just before lunch or at the end of the day). In another study of first grade classrooms, Good (1970) found that students ranked as high in achievement by teachers received two times the opportunity to respond overall and three times the opportunity to respond academically as students ranked as low. In a similar study by Brophy and Good (1970), it was reported that high students received twice as much praise as low students, while low students received more opportunities to read. Overall, Brophy and Good concluded that there were differences between the high and low ranked students in the quality, but not quantity, of interactions with the teacher. In a British study of students ranked according to achievement scores, Bennett, Jordan, Long, and Wade (1976) reported that high students received twice as much reading, 21% more work activity in reading, and 23% more work activity in math than low students. Alpert (1975) found that teachers

responded differentially to their reading groups in that they used more readers and more difficult readers in their top reading groups.

Two in-depth, ethological studies also found that high and low reading group students received differential treatment by teachers. Rist (1970) periodically observed one class across three years (K-grade 2) and found that students in the high group received more of the teacher's time, more rewards, and greater teacher attention; the low group received significantly more discipline from the teacher. Similarly, McDermott (1977) reported that in one classroom, the low reading group received only 1/3 as much of the teacher's time as the high group. Furthermore, the quality of the time in the lowest group was less; the group was judged as poorly organized and the teacher allowed more interruptions of the low group.

Teacher reports of allocated time available to various groups of students have indicated that lower achieving students receive more teacher time and resources. Kiesling (1977) and Streeter and Kidder (1977) obtained teacher reports of time allocation and services available; they reported that lower students recieved more resources, particularly more time with teacher aides and other ancillary personnel. The findings of these studies using teacher reports of time allocation to students contradict the results of observational studies, in which teachers were found to spend more time and/or higher quality time with high students. The contradictory results may be due in part to the method of data collection; teacher reports of what they do may be quite different from what actually occurs. Goldenberg (1966) reported that although the teachers spent more time with their high reading groups, they were not aware of

the difference when questioned by the researchers. Observational studies are probably the more accurate method of assessing time teachers spend with their pupils.

Other reports suggest that even the behavior of students depends on their ranking. Good and Beckerman (1978) found that students ranked as high in achievement by teachers spent more time on task (75%) as compared to students ranked low (67% time on task). Soli and Devine (1976) also reported that low students, as defined by their performance on an achievement test, spent less time on task than high students. For the low students, the absence of inappropriate behavior was the best predictor of achievement; for high students, time spent attending was most predictive. In a study of the adjustment level of the student as rated by teachers and its relation to behavior, Werner and Simpson (1974) concluded that students considered to be adjusted spent more time on task.

Yet other observational studies of the relationship between student ability and teacher interaction with students have found either that lower ability students received more time than higher students or that there were no differences across groups. Jacobsen (1980) reported that low ability students received most of the teachers' time and high ability students received the least teacher time. The quality of this time was not reported. However, the findings of Rist (1970) suggested that while lower students received more teacher time, the nature of the contacts was negative (e.g., being disciplined or having errors corrected). Weinstein (1976) found that lower students received more opportunities to respond than higher students, received more teacher praise, and were in smaller groups for reading. The fact that the groups were smaller for low students means that students had more contact with the teacher,

which may have contributed to the advantages reported in the study. An additional finding by Weinstein was that the lower students made more errors in reading, yet their reading errors were corrected less often than were errors made in the higher groups. Alpert (1974) also reported that there were fewer students in the lower reading groups. In her study of only those teachers ranked as "good," she found that these teachers exhibited no differences in their treatments of high or low reading groups. For example, there were no differences in the amount of time devoted to groups, the time of day groups were held, the quality or the reading group time, or the verbal behaviors of the teachers.

Two additional studies are relevant to the discussion of teacher interaction with different groups of students. Silberman (1969) conducted a study in which teachers rated students into four groups: (1) attachment (students that teachers prefer), (2) concern (students who are demanding of teacher time), (3) indifference (students that teachers know little about), and (4) rejection (students that teachers would want removed from their classrooms). Observations were conducted in classrooms to assess the interactions between teachers and students relative to student ranking. Silberman found that teacher interactions occurred most frequently with the rejection and concern groups and that the nature of the teacher-student interactions for the rejection group was negative. In a later study, Good and Brophy (1972) attempted to replicate and expand the Silberman findings. In addition to obtaining rankings according to the four groups, they collected achievement rankings and observed whether the teacher-student interactions were initiated by the student or the teacher. Good and Brophy's results indicated that

the attachment group was comprised of students high in achievement; students low in achievement belonged to either the rejection or indifference group. The attachment group, or high achievers, received the most teacher contact and praise. Low achievers, when members of the rejection group, received the most behavioral contacts and criticism but fewer opportunities to respond. Low achievers in the indifference group received fewer contacts overall, both in academic opportunity to respond and in behavioral contacts.

In the areas of student-teacher interactions and student responding time in special education classrooms, few research studies are available. Larrivee and Vacca (1980) applied the observational paradigm of academic learning time to the study of mainstreamed handicapped students (primarily learning disabled). They reported that higher students in regular classes received more academic learning time than the mainstreamed children. However, lower regular class students and the mainstreamed students did not differ in academic learning time. Furthermore, there were no differences in time allocated to instruction to regular class or mainstreamed students. Leinhardt, Zigmond, and Cooley (1980) studied student responding time in self-contained LD classrooms and reported that overall, LD students spent little actual time in academic responses such as reading or writing while spending significantly more time in task management and "waiting." Also, they noted that there was considerable variability across students in time spent in various activities. These findings for LD classrooms are similar to the results of studies in regular classrooms. However, in a study of special education classrooms for severely and profoundly handicapped students, McCormick and

Goldman (1979) report that these students received significantly less instructional time than regular class students.

Across the studies reviewed, most reported differences in teacher-student interactions for various groups of students. Among the few studies of student behavior (attention to task) across groups, the findings were consistent: in all cases higher ranked students were found to be on task a greater percentage of the time. The findings for teacher behavior toward these students and time allocations received by groups of students were inconsistent, primarily as a function of differing methods of data collection, subject selection procedures, and variables studied. For example, teacher reports of allocated time suggested that lower students received more teacher time, whereas observational studies tended to indicate that teachers spent more time with higher students. Another dimension of the time issue is the quality of time spent. While some studies reported that low students received more contact from teachers (Jacobsen, 1980; Weinstein, 1976), findings of other studies suggested that the nature of these increased contacts generally was disciplinary or for the purpose of correcting errors (Good & Brophy, 1972; Rist, 1970; Silberman, 1969). Yet another factor that may account for increased teacher contact for the lower groups is that these groups were smaller and therefore had lower teacher-student ratios (Alpert, 1974; Weinstein, 1976). Additional methodological issues include the ways in which students were classified (e.g., teacher ratings, achievement test scores, existing class groupings) and the impact of the observer's knowledge of the student's classification on the data collection.

Conclusion

As noted throughout this review, there are several methodological concerns regarding the study of time variables in relation to student achievement. Chief among these issues are: the definition and measurement of time, the population sampled, the length and focus of observations, and the methods of reporting data. The definition of time has an important effect on the results obtained; more discrete, specific measures of time yield more accurate estimates of how time is spent. For example, studies of teacher reports of allocated time have resulted in inconsistent results of the effect of time on achievement, whereas the more specific measure of observed engaged time has yielded more powerful results regarding the relationship between time and achievement. Thus, specific measures of engaged time are preferred over measures of allocated time, and direct observation is preferred over obtaining teacher reports (Hall et al., undated; Karweit & Slavin, 1981).

The population that is sampled in observation of time is another important consideration. Studies to date have sampled from a limited number of populations. For example, one set of studies observed only inner city and suburban students (Hall et al., undated; Greenwood et al., 1981), and another set observed only those students between the 30th and 60th percentiles in achievement (Berliner, 1979, 1980a; Fisher et al., 1980; Rosenshine, 1980). For "normative" purposes and to aid generalizability of findings, it is important to obtain results from other populations (Rosenshine, 1979).

Other methodological dimensions on which studies have varied are (a) unit of observation, and (b) period of observation. Observation systems may focus either on an individual student or on an entire class.

Studies focusing on individual students have the advantage of finding higher correlations with achievement than do studies focusing on an entire class (Borg, 1980). The period of observation also may differ. Some studies have conducted observations over the entire time students are in class (Juniper Gardens studies of Hall, Greenwood, and colleagues) while others have focused on specific subjects taught during a portion of the class (BTES studies of Berliner and colleagues). The period of observation has important implications regarding how results are reported and analyzed. For instance, when reporting the proportion of time that students are engaged, the percent of engaged time will be higher if observations were conducted only during reading or math than if observations were conducted over the entire class time. Highlighting this difference are the Juniper Gardens findings, which indicated that students were engaged academically approximately 25% of the total class time (Hall et al., undated) and the findings from BTES, which indicated that students were engaged approximately 70% of the time during reading and math instruction (Rosenshine, 1979).

A related issue is the practical utility of reporting results in percentages. To say that a student is engaged 50% of the time may lead to quite different implications depending on the amount of time that student actually spends engaged. As an illustration of this point, a student who is engaged for 50% of one hour spends 30 minutes in academic practice whereas a student who is engaged for 50% of 10 minutes spends only 5 minutes in practice. Therefore, it is important to report results in terms of actual minutes in addition to percentages.

A final issue relative to the reporting of results is the familiar caution that a significant correlation between factors does not suggest a causal relationship. Yet, in reporting results, some studies have strayed from this basic premise and gone beyond the data to imply that increased time in learning leads to increases in achievement. Such a statement cannot be made unless the research employs a model that allows these conclusions.

In consideration of these methodological concerns, the observational research conducted by the IRLD (a) employed direct observation of individual students over the entire class day, (b) included students randomly selected from several different populations (grades 2-4, including regular class students, mainstreamed LD students, and LD students in self-contained classrooms), and (c) calculated both percentages of engaged time and number of engaged minutes over the school day. The major focus of the research was to describe the quantity of time students spend in various academic and non-academic activities, with consideration of teacher-student interaction variables and the instructional ecology (e.g., the structure of the class and materials used).

References

Alpert, J. Teacher behavior across ability groups: A consideration of the mediation of pygmalion effects. Journal of Educational Psychology, 1974, 66, 348-353.

Alpert, J. Do teachers adapt methods and materials to ability groups in reading? California Journal of Educational Research, 1975, 26, 120-123.

Anderson, L. Student involvement in learning and school achievement. California Journal of Educational Research, 1975, 26, 53-62.

Arehart, J. Student opportunity to learn related to student achievement of objectives in a probability unit. Journal of Educational Research, 1979, 72, 253-259.

Baer, D., & Bushell, D. The future of behavior analysis in the schools? Consider its recent past and then ask a different question. School Psychology Review, 1981, 10, 259-270.

Barber, I., & Silver, M. Fact, fiction, and the experimenter bias effect. Psychological Bulletin, 1968, 70(6, Pt 2).

Bennett, N., Jordan, J., Long, G., & Wade, B. Teaching styles and pupil progress. London: Open Books, 1976.

Berliner, D. Impediments to the study of teacher effectiveness. Journal of Teacher Education, 1976, 27, 5-13.

Berliner, D. Tempus educare. In P. Peterson & H. Walberg (Eds.), Research on Teaching. Berkeley: McCutchan, 1979.

Berliner, D. Allocated time, engaged time, and academic learning time in elementary school mathematics instruction. Focus on Problems in Mathematics, 1980, 2, 27-39. (a)

Berliner, D. Using research on teaching for the improvement of classroom practice. Theory into Practice, 1980, 19, 302-308. (b)

Berliner, D., & Rosenshine, B. The acquisition of knowledge in the classroom. In R. Anderson, R. Spiro, & W. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, N.J.: Erlbaum Associates, 1977.

Berscheid, E., & Walster, E. Physical attractiveness. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 7). New York: Academic Press, 1974.

Bloom, B. Time and learning. American Psychologist, 1974, 29, 682-688.

Bloom, B. The new direction in educational research: Alterable variables. Phi Delta Kappan, 1980, 61, 382-385.

Borg, W. Teacher coverage of academic content and pupil achievement. Journal of Educational Psychology, 1979, 71, 635-645.

Borg, W. Time and school learning. In C. Denham & A. Lieberman (Eds.), Time to learn. Washington, D.C.: National Institute of Education, 1980.

Brookover, W., & Lezotte, L. Changes in school characteristics coincident with changes in student achievement (Occasional Paper No. 17). East Lansing, Mich.: Michigan Institute for Research on Teaching, Michigan State University, May, 1979.

Brophy, J., & Good, T. Teachers' communication of differential expectations for children's classroom performance: Some behavioral data. Journal of Educational Psychology, 1970, 61, 365-374.

Brophy, J. E., & Good, T. L. Teacher-student relations: Causes and consequences. New York: Holt & Rinehart, 1974.

Carroll, J. A model of school learning. Teachers College Record. 1963, 64, 723-733.

Centra, J., & Potter, D. School and teacher effects: An inter-relational model. Review of Educational Research, 1980, 50, 273-291.

Chang, S., & Raths, J. The schools' contribution to the cumulating deficit. Journal of Educational Research, 1971, 64, 272-276.

Christenson, S., Graden, J., Potter, M., Taylor, J., Yanowitz, B., & Ysseldyke, J. E. Current research on psychoeducational assessment and decision making: Implications for training and practice (Monograph No. 16). Minneapolis: University of Minnesota, Institute for Research on Learning Disabilities, 1981.

Christenson, S., Ysseldyke, J., & Algozzine, B. Institutional constraints and external pressures. Psychology in the Schools, in press.

Claiborne, W. Expectancy effects in the classroom: A failure to replicate. Journal of Educational Psychology, 1969, 60, 377-383.

Cobb, J. Relationship of discrete classroom behaviors to 4th grade academic achievement. Journal of Educational Psychology, 1972, 63, 74-80.

Coleman, J. Equality of educational opportunity. Washington, D.C.: U.S. Department of Health, Education, and Welfare, Office of Education, 1966.

Comber, L., & Keeves, J. Science education in 19 countries: An empirical study. New York: John Wiley, 1973.

Conant, E. What do teachers do all day. Saturday Review/World, June 1, 1974, 55.

Cooley, W., & Leinhardt, G. The instructional dimensions study. Educational Evaluation and Policy Analysis, 1980, 2, 7-24.

Felsenthal, H., & Kirsch, I. Variations in teachers' management of time and time spent on reading instruction: Effects on student learning. Paper presented at the annual meeting of the American Educational Research Association, Toronto, 1978. (ERIC Document Reproduction Service No. ED 159-614)

Fisher, C., Berliner, D., Filby, N., Marliave, R., Cohen, L., & Dishaw, M. Teaching behaviors, academic learning time, and student achievement: An overview. In C. Denham & A. Lieberman (Eds.), Time to learn. Washington, D.C.: National Institute of Education, 1980.

Foster, G., & Ysseldyke, J. Expectancy and halo effects as a result of artificially induced teacher bias. Contemporary Educational Psychology, 1976, 1, 37-45.

Foster, G., Ysseldyke, J., & Reese, J. I wouldn't have seen it if I hadn't believed it. Exceptional Children, 1975, 41, 469-474.

Frederick, W. The use of classroom time in high schools above or below the median reading score. Urban Education, 1977, 11, 459-464.

Frederick, W., Easton, J., Muirhead, S., & Vanderwicken, S. Procedures and use of time in reading classes in high gain and low gain elementary schools in Chicago. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, 1979. (ERIC Document Reproduction Service No. ED 176-237)

Frederick, W., & Walberg, H. Learning as a function of time. Journal of Educational Research, 1980, 73, 183-194.

Frederick, W., Walberg, H., & Rasher, S. Time, teacher comments, and achievement in urban high schools. Journal of Educational Research, 1979, 73, 63-65.

Gaver, D., & Richards, H. Dimensions of naturalistic observation for the prediction of academic success. Journal of Educational Research, 1979, 72. 123-127.

Goldenberg, I. Reading groups and some aspects of teacher behavior. In F. Kaplan & S. Sarason (Eds.), The psycho-educational clinic: Papers and research studies. New Haven, Conn.: Yale University, 1966.

Good, T. Which pupils do teachers call on? Elementary School Journal, 1970, 70, 190-198.

Good, T., & Beckerman, T. Time on task: A naturalistic study in 6th grade classrooms. Elementary School Journal, 1978, 78, 192-201.

Good, T., & Brophy, J. Behavioral expression of teacher attitudes. Journal of Educational Psychology, 1972, 63, 617-624.

Good, T., & Grouws, D. Teaching effects: A process-product study in 4th grade mathematics classrooms. Journal of Teacher Education, 1977, 28, 49-54.

Good, T., Grouws, D., & Beckerman, T. Curriculum pacing: Some empirical data in mathematics. Curriculum Studies, 1978, 10, 75-81.

Greenwood, C., Delquadri, J., Stanley, S., Terry, B., & Hall, R. Process-product study of relationships among instructional ecology, student response, and academic achievement. Unpublished manuscript, Juniper Gardens Children's Project, University of Kansas, 1981.

Guthrie, J., Martuza, V., & Seifert, M. Impacts of instructional time on reading. Unpublished manuscript, University of Pennsylvania, Pittsburgh, 1976. (ERIC Document Reproduction Service No. ED 155-645)

Hall, R., Greenwood, C., & Delquadri, J. The importance of opportunity to respond to children's academic success. Unpublished manuscript, Juniper Gardens Children's Project, University of Kansas, undated.

Harnischfeger, A., & Wiley, D. The teaching-learning process in elementary schools: A synoptic view. Curriculum Inquiry, 1976, 6, 6-43.

Harris, A., & Serwer, B. The CRAFT Project: Instructional time in reading research. Reading Research Quarterly, 1966, 2, 27-56.

Helms, D. A basic skills instructional improvement program: An overview. Paper presented at the annual meeting of the American Educational Research Association, Boston, 1980.

Heyns, B. Summer learning and the effects of schooling. New York: Academic Press, 1978.

Hoge, R., & Luce, S. Predicting academic achievement from classroom behavior. Review of Educational Research, 1979, 49, 479-496.

Husen, T. (Ed.). International study of achievement in mathematics (Vol. 2). New York: John Wiley, 1967.

Hyman, H., Wright, C., & Reed, J. The enduring effects of education. Chicago: University of Chicago Press, 1975.

Jackson, P., & Lahaderne, H. Inequalities of teacher-pupil contacts. Psychology in the Schools, 1967, 4, 204-211.

Jacobsen, K. The relationship of individual student time allocated to reading and math achievement: Report from the Project of Studies of Administration and Organization for Instruction. Madison, Wisc.: University of Wisconsin, November, 1980. (ERIC Document Reproduction Service No. ED 196-906)

Jencks, C. Inequality: A reassessment of the effects of family and schooling in America. New York: Basic Books, 1972.

Karweit, N. Quantity of schooling: A major educational factor? Educational Research, 1976, 5, 15-17.

Karweit, N., & Slavin, R. Measurement and modeling choices in studies of time and learning. American Educational Research Journal, 1981, 18, 157-171.

Kiesling, H. Productivity of instructional time by mode of instruction for students at varying levels of reading skill. Reading Research Quarterly, 1977, 13, 554-582.

Lahaderne, H. Attitudinal and intellectual correlates of attention: A study of four 6th grade reading classrooms. Journal of Educational Psychology, 1968, 59, 320-324.

Larrivee, B., & Vacca, J. A comparison of academic learning time (ACT) for mainstreamed, low, average, and high ability students. Paper presented at the annual meeting of the American Educational Research Association, Boston, 1980.

Leinhardt, G. Program evaluation: An empirical study of individualized instruction. American Educational Research Journal, 1977, 14, 277-293.

Leinhardt, G., Zigmond, N., & Cooley, W. Reading instruction and its effects. Paper presented at the annual meeting of the American Educational Research Association, Boston, 1980.

Leonard, J. 180 day barrier: Issues and concerns. Exceptional Children, 1981, 47, 246-253.

Mann, C. How schools use their time: Time allotment practice in 444 cities including a study of trends from 1826 to 1926. New York: Columbia University, Bureau of Publications, 1928.

McCormick, L., & Goldman, R. The transdisciplinary model: Implications for service delivery and personnel preparation for the severely and profoundly handicapped. AAESPH Review, 1979, 4, 152-161.

McDermott, R. Social relations as contexts for learning in school. Harvard Educational Review, 1977, 47, 198-213.

McKinney, J., Mason, J., Perkerson, K., & Clifford, M. Relationship between classroom behavior and academic achievement. Journal of Educational Psychology, 1975, 67, 198-203.

Meichenbaum, D., Bowers, K., & Ross, A. A behavioral analysis of teacher expectancy effect. Journal of Personality and Social Psychology, 1969, 13, 306-316.

Miller, C., McLaughlin, J., Haddon, J., & Chansky, N. Socio-economic class and teacher bias. Psychological Reports, 1968, 23, 806.

Purves, A., & Levine, D. (Eds.). Educational policy and international assessment: Implications of the IEA Survey of Achievement. Berkeley: McCutchan, 1975.

Rist, R. Student social class and teacher expectations: The self-fulfilling prophecy in ghetto education. Harvard Educational Review, 1970, 40, 411-450.

Roehler, L., Schmidt, W., & Buchman, M. How do teachers spend their language arts time? (Research Report No. 66). East Lansing, Mich.: Michigan Institute for Research on Teaching, Michigan State University, December 1979.

Rosenshine, B. Recent research on teaching behavior and student achievement. Journal of Teacher Education, 1976, 27, 61-64.

Rosenshine, B. Academic engaged time, content covered, and direct instruction. Unpublished manuscript, University of Illinois, 1978. (ERIC Document Reproduction Service No. ED 152-776)

Rosenshine, B. Content, time, and direct instruction. In P. Peterson & H. Walberg (Eds.), Research on teaching: Concepts, findings, and implications. Berkeley: McCutchan, 1979.

Rosenshine, B. How time is spent in elementary classrooms. In C. Denham & A. Lieberman (Eds.), Time to learn. Washington, D.C.: National Institute for Education, 1980.

Rosenshine, B., & Berliner, D. Academic engaged time. British Journal of Teacher Education, 1978, 4, 3-16.

Rosenthal, R., & Jacobsen, L. Pygmalion in the classroom: Teacher expectation and pupils' intellectual development. New York: Holt, Rinehart, & Winston, 1968.

Rubovits, R., & Maehr, M. Pygmalion analyzed: Toward an explanation of the Rosenthal-Jacobsen findings. Journal of Personality and Social Psychology, 1971, 19, 197-203.

Rubovits, P., & Maehr, M. Pygmalion black and white. Journal of Personality and Social Psychology, 1973, 25, 210-218.

Ruff, F. Instructional variables and student achievement in reading and mathematics: A synthesis of recent product-process research. Unpublished manuscript, Research for Better Schools, Philadelphia, 1978.

Rupley, W., & McNamara, J. Longitudinal investigation of the effects of teachers' reading instructional emphasis and pupil engaged time in reading instruction on pupils' reading achievement. Paper presented at the annual meeting of the National Reading Conference, St. Petersburg, 1978. (ERIC Document Reproduction Service No. ED 185-496)

Samuels, J., & Turnure, J. Attention and reading achievement in first grade boys and girls. Journal of Educational Psychology, 1974, 66, 29-32.

Silberman, M. Behavioral expression of teachers' attitudes toward elementary school students. Journal of Educational Psychology, 1969, 60, 402-407.

Smith, N. Allocation of time and achievement in elementary social studies. Journal of Educational Research, 1979, 72, 231-236.

Snow, R. Unfinished pygmalion. Contemporary Psychology, 1969, 14, 197-199.

Soar, R. S. Final report: Follow Through classroom process measurement and pupil growth (1970-1971). Unpublished manuscript, University of Florida, 1973.

Soli, S., & Devine, V. Behavioral correlates of achievement: A look at high and low achievers. Journal of Educational Psychology, 1976, 68, 335-341.

Stallings, J. Implementation and child effects of teaching practices in Follow-Through classrooms. Monographs of the Society for Research in Child Development, 1975, 40 (Serial No. 163).

Stallings, J. How instructional processes relate to child outcomes in a national study of Follow Through. Journal of Teacher Education, 1976, 27, 43-47.

Stallings, J. Allocated academic learning time revisited, or beyond time on task. Educational Researcher, 1980, 9, 11-16.

Streeter, R., & Kidder, S. The distribution of instructional resources to students of varying abilities. Paper presented at the annual meeting of the American Educational Research Association, New York, 1977. (ERIC Document Reproduction Service No. ED 137-933)

Thorndike, R. Review of R. Rosenthal and L. Jacobsen "Pygmalion in the classroom." American Educational Research Journal, 1968, 5, 708-711.

Weinstein, R. Reading group membership in first grade: Teacher behaviors and pupil experience over time. Journal of Educational Psychology, 1976, 68, 103-116.

Welch, W., & Bridgham, R. Physics achievement gains as a function of teaching duration. School Science and Mathematics, 1968, 68, 449-454.

Werner, C., & Simpson, R. Attention to task and completion of work as a function of level of adjustment and educational environment. Journal of Educational Research, 1974, 68, 56-58.

Wiley, D., & Harnischfeger, A. Explosion of a myth: Quantity of schooling and exposure to instruction: Major educational vehicles. Educational Researcher, 1974, 3, 7-12.

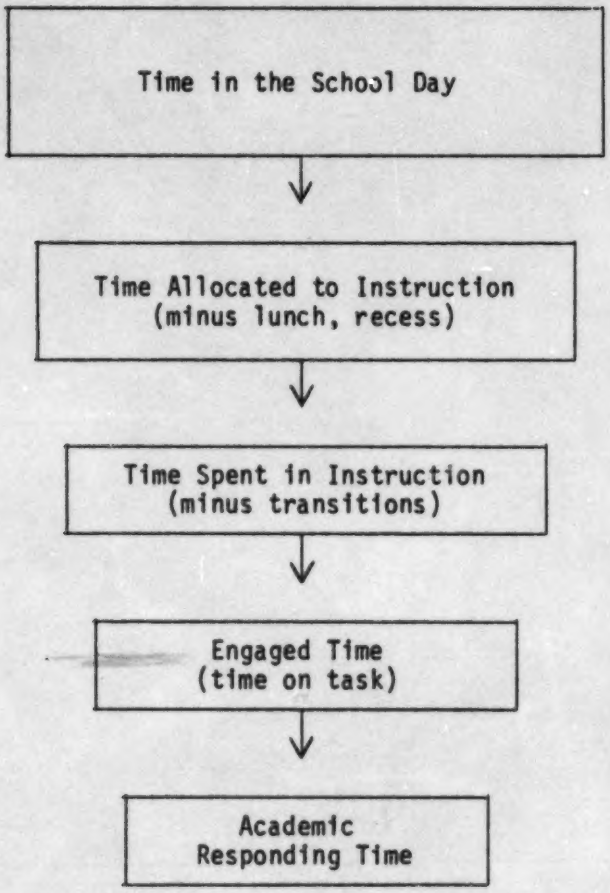

Figure 1. Breakdown of the Measurement of Time Spent in Learning

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Ysseldyke, J. E. Assessing the learning disabled youngster: The state of the art (Research Report No. 1). November, 1977.

Ysseldyke, J. E., & Regan, R. R. Nondiscriminatory assessment and decision making (Monograph No. 7). February, 1979.

Foster, G., Algozzine, B., & Ysseldyke, J. Susceptibility to stereotypic bias (Research Report No. 3). March, 1979.

Algozzine, B. An analysis of the disturbingness and acceptability of behaviors as a function of diagnostic label (Research Report No. 4). March, 1979.

Algozzine, B., & McGraw, K. Diagnostic testing in mathematics: An extension of the PIAT? (Research Report No. 5). March, 1979.

Deno, S. L. A direct observation approach to measuring classroom behavior: Procedures and application (Research Report No. 6). April, 1979.

Ysseldyke, J. E., & Mirkin, P. K. Proceedings of the Minnesota roundtable conference on assessment of learning disabled children (Monograph No. 8). April, 1979.

Somwaru, J. P. A new approach to the assessment of learning disabilities (Monograph No. 9). April, 1979.

Algozzine, B., Forgnone, C., Mercer, C. D., & Trifiletti, J. J. Toward defining discrepancies for specific learning disabilities: An analysis and alternatives (Research Report No. 7). June, 1979.

Algozzine, B. The disturbing child: A validation report (Research Report No. 8). June, 1979.

Note: Monographs No. 1 - 6 and Research Report No. 2 are not available for distribution. These documents were part of the Institute's 1979-1980 continuation proposal, and/or are out of print.

Ysseldyke, J. E., Algozzine, B., Regan, R., & Potter, M. Technical adequacy of tests used by professionals in simulated decision making (Research Report No. 9). July, 1979.

Jenkins, J. R., Deno, S. L., & Mirkin, P. K. Measuring pupil progress toward the least restrictive environment (Monograph No. 10). August, 1979.

Mirkin, P. K., & Deno, S. L. Formative evaluation in the classroom: An approach to improving instruction (Research Report No. 10). August, 1979.

Thurlow, M. L., & Ysseldyke, J. E. Current assessment and decision-making practices in model programs for the learning disabled (Research Report No. 11). August, 1979.

Deno, S. L., Chiang, B., Tindal, G., & Blackburn, M. Experimental analysis of program components: An approach to research in CSDC's (Research Report No. 12). August, 1979.

Ysseldyke, J. E., Algozzine, B., Shinn, M., & McGue, M. Similarities and differences between underachievers and students labeled learning disabled: Identical twins with different mothers (Research Report No. 13). September, 1979.

Ysseldyke, J., & Algozzine, R. Perspectives on assessment of learning disabled students (Monograph No. 11). October, 1979.

Poland, S. F., Ysseldyke, J. E., Thurlow, M. L., & Mirkin, P. K. Current assessment and decision-making practices in school settings as reported by directors of special education (Research Report No. 14). November, 1979.

McGue, M., Shinn, M., & Ysseldyke, J. Validity of the Woodcock-Johnson psycho-educational battery with learning disabled students (Research Report No. 15). November, 1979.

Deno, S., Mirkin, P., & Shinn, M. Behavioral perspectives on the assessment of learning disabled children (Monograph No. 12). November, 1979.

Sutherland, J. H., Algozzine, B., Ysseldyke, J. E., & Young, S. What can I say after I say LD? (Research Report No. 16). December, 1979.

Deno, S. L., & Mirkin, P. K. Data-based IEP development: An approach to substantive compliance (Monograph No. 13). December, 1979.

Ysseldyke, J., Algozzine, B., Regan, R., & McGue, M. The influence of test scores and naturally-occurring pupil characteristics on psycho-educational decision making with children (Research Report No. 17). December, 1979.

Algozzine, B., & Ysseldyke, J. E. Decision makers' prediction of students' academic difficulties as a function of referral information (Research Report No. 18). December, 1979.

Ysseldyke, J. E., & Algozzine, B. Diagnostic classification decisions as a function of referral information (Research Report No. 19). January, 1980.

Deno, S. L., Mirkin, P. K., Chiang, B., & Lowry, L. Relationships among simple measures of reading and performance on standardized achievement tests (Research Report No. 20). January, 1980.

Deno, S. L., Mirkin, P. K., Lowry, L., & Kuehnle, K. Relationships among simple measures of spelling and performance on standardized achievement tests (Research Report No. 21). January, 1980.

Deno, S. L., Mirkin, P. K., & Marston, D. Relationships among simple measures of written expression and performance on standardized achievement tests (Research Report No. 22). January, 1980.

Mirkin, P. K., Deno, S. L., Tindal, G., & Kuehnle, K. Formative evaluation: Continued development of data utilization systems (Research Report No. 23). January, 1980.

Deno, S. L., Mirkin, P. K., Robinson, S., & Evans, P. Relationships among classroom observations of social adjustment and sociometric rating scales (Research Report No. 24). January, 1980.

Thurlow, M. L., & Ysseldyke, J. E. Factors influential on the psychoeducational decisions reached by teams of educators (Research Report No. 25). February, 1980.

Ysseldyke, J. E., & Algozzine, B. Diagnostic decision making in individuals susceptible to biasing information presented in the referral case folder (Research Report No. 26). March, 1980.

Thurlow, M. L., & Greener, J. W. Preliminary evidence on information considered useful in instructional planning (Research Report No. 27). March, 1980.

Ysseldyke, J. E., Regan, R. R., & Schwartz, S. Z. The use of technically adequate tests in psychoeducational decision making (Research Report No. 28). April, 1980.

Richey, L., Potter, M., & Ysseldyke, J. Teachers' expectations for the siblings of learning disabled and non-learning disabled students: A pilot study (Research Report No. 29). May, 1980.

Thurlow, M. L., & Ysseldyke, J. E. Instructional planning: Information collected by school psychologists vs. information considered useful by teachers (Research Report No. 30). June, 1980.

Algozzine, B., Webber, J., Campbell, M., Moore, S., & Gilliam, J. Classroom decision making as a function of diagnostic labels and perceived competence (Research Report No. 31). June, 1980.

Ysseldyke, J. E., Algozzine, B., Regan, R. R., Potter, M., Richey, L., & Thurlow, M. L. Psychoeducational assessment and decision making: A computer-simulated investigation (Research Report No. 32). July, 1980.

Ysseldyke, J. E., Algozzine, B., Regan, R. R., Potter, M., & Richey, L. Psychoeducational assessment and decision making: Individual case studies (Research Report No. 33). July, 1980.

Ysseldyke, J. E., Algozzine, B., Regan, R., Potter, M., & Richey, L. Technical supplement for computer-simulated investigations of the psychoeducational assessment and decision-making process (Research Report No. 34). July, 1980.

Algozzine, B., Stevens, L., Costello, C., Beattie, J., & Schmid, R. Classroom perspectives of LD and other special education teachers (Research Report No. 35). July, 1980.

Algozzine, B., Siders, J., Siders, J., & Beattie, J. Using assessment information to plan reading instructional programs: Error analysis and word attack skills (Monograph No. 14). July, 1980.

Ysseldyke, J., Shinn, M., & Epps, S. A comparison of the WISC-R and the Woodcock-Johnson Tests of Cognitive Ability (Research Report No. 36). July, 1980.

Algozzine, B., & Ysseldyke, J. E. An analysis of difference score reliabilities on three measures with a sample of low achieving youngsters (Research Report No. 37). August, 1980.

Shinn, M., Algozzine, B., Marston, D., & Ysseldyke, J. A theoretical analysis of the performance of learning disabled students on the Woodcock-Johnson Psycho-Educational Battery (Research Report No. 38). August, 1980.

Richey, L. S., Ysseldyke, J., Potter, M., Regan, R. R., & Greener, J. Teachers' attitudes and expectations for siblings of learning disabled children (Research Report No. 39). August, 1980.

Ysseldyke, J. E., Algozzine, B., & Thurlow, M. L. (Eds.). A naturalistic investigation of special education team meetings (Research Report No. 40). August, 1980.

Meyers, B., Meyers, J., & Deno, S. Formative evaluation and teacher decision making: A follow-up investigation (Research Report No. 41). September, 1980.

Fuchs, D., Garwick, D. R., Featherstone, N., & Fuchs, L. S. On the determinants and prediction of handicapped children's differential test performance with familiar and unfamiliar examiners (Research Report No. 42). September, 1980.

Algozzine, B., & Stoller, L. Effects of labels and competence on teachers' attributions for a student (Research Report No. 43). September, 1980.

Ysseldyke, J. E., & Thurlow, M. L. (Eds.). The special education assessment and decision-making process: Seven case studies (Research Report No. 44). September, 1980.

Ysseldyke, J. E., Algozzine, B., Potter, M., & Regan, A. A descriptive study of students enrolled in a program for the severely learning disabled (Research Report No. 45). September, 1980.

Marston, D. Analysis of subtest scatter on the tests of cognitive ability from the Woodcock-Johnson Psycho-Educational Battery (Research Report No. 46). October, 1980.

Algozzine, B., Ysseldyke, J. E., & Shinn, M. Identifying children with learning disabilities: When is a discrepancy severe? (Research Report No. 47). November, 1980.

Fuchs, L., Tindal, J., & Deno, S. Effects of varying item domain and sample duration on technical characteristics of daily measures in reading (Research Report No. 48). January, 1981.

Marston, D., Lowry, L., Deno, S., & Mirkin, P. An analysis of learning trends in simple measures of reading, spelling, and written expression: A longitudinal study (Research Report No. 49). January, 1981.

Marston, D., & Deno, S. The reliability of simple, direct measures of written expression (Research Report No. 50). January, 1981.

Epps, S., McGue, M., & Ysseldyke, J. E. Inter-judge agreement in classifying students as learning disabled (Research Report No. 51). February, 1981.

Epps, S., Ysseldyke, J. E., & McGue, M. Differentiating LD and non-LD students: "I know one when I see one" (Research Report No. 52). March, 1981.

Evans, P. R., & Peham, M. A. S. Testing and measurement in occupational therapy: A review of current practice with special emphasis on the Southern California Sensory Integration Tests (Monograph No. 15). April, 1981.

Fuchs, L., Wesson, C., Tindal, G., & Mirkin, P. Teacher efficiency in continuous evaluation of IEP goals (Research Report No. 53). June, 1981.

Fuchs, D., Featherstone, N., Garwick, D. R., & Fuchs, L. S. The importance of situational factors and task demands to handicapped children's test performance (Research Report No. 54). June, 1981.

Tindal, G., & Deno, S. L. Daily measurement of reading: Effects of varying the size of the item pool (Research Report No. 55). July, 1981.

Fuchs, L. S., & Deno, S. L. A comparison of teacher judgment, standardized tests, and curriculum-based approaches to reading placement (Research Report No. 56). August, 1981.

Fuchs, L., & Deno, S. The relationship between curriculum-based mastery measures and standardized achievement tests in reading (Research Report No. 57). August, 1981.

Christenson, S., Graden, J., Potter, M., & Ysseldyke, J. Current research on psychoeducational assessment and decision making: Implications for training and practice (Monograph No. 16). September, 1981.

Christenson, S., Ysseldyke, J., & Algozzine, B. Institutional constraints and external pressures influencing referral decisions (Research Report No. 58). October, 1981.

Fuchs, L., Fuchs, D., & Deno, S. Reliability and validity of curriculum-based informal reading inventories (Research Report No. 59). October, 1981.

Algozzine, B., Christenson, S., & Ysseldyke, J. Probabilities associated with the referral-to-placement process (Research Report No. 60). November, 1981.

Tindal, G., Fuchs, L. Christenson, S., Mirkin, P., & Deno, S. The relationship between student achievement and teacher assessment of short- or long-term goals (Research Report No. 61). November, 1981.

Mirkin, P., Fuchs, L., Tindal, G., Christenson, S., & Deno, S. The effect of IEP monitoring strategies on teacher behavior (Research Report No. 62). December, 1981.

Wesson, C., Mirkin, P., & Deno, S. Teachers' use of self instructional materials for learning procedures for developing and monitoring progress on IEP goals (Research Report No. 63). January, 1982.

Fuchs, L., Wesson, C., Tindal, G., Mirkin, P., & Deno, S. Instructional changes, student performance, and teacher preferences: The effects of specific measurement and evaluation procedures (Research Report No. 64). January, 1982.

Potter, M., & Mirkin, P. Instructional planning and implementation practices of elementary and secondary resource room teachers: Is there a difference? (Research Report No. 65). January, 1982.

Thurlow, M. L., & Ysseldyke, J. E. Teachers' beliefs about LD students (Research Report No. 66). January, 1982.

Graden, J., Thurlow, M. L., & Ysseldyke, J. E. Academic engaged time and its relationship to learning: A review of the literature (Monograph No. 17). January, 1982.